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New Agricultural Implements for India

BY

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New Agricultural Implements for India.

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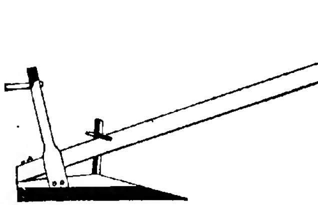
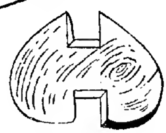
THE following implements were introduced at various times by the writer and used in Sind. They are mostly modifications of implements in common use in Egyptian Agriculture and are likely to be most useful in irrigated districts. All have been thoroughly tested and are thoroughly practical.

I. Plough.





Ridging Attachment.

This has " caught on " very well in some parts of Sind and is ousting the native plough which is little more than an iron spike fixed to the end of a pole.

The above plough is like the indigenous wooden plough of Egypt. When the land can be softened by water it is an efficient implement and is specially useful in small plots and in rough ground containing tree stumps and roots. It is really a 1-toothed cultivator and holds its own in the estimation of the " fellah " against repeated attempts to introduce iron ploughs. Plate I)

Construction. The pole is made of jarrah or any long grained wood and should be about 11 feet long and 4 inches broad and 2½ inches thick. The body is of babul wood about 3 feet 6 inches long. The body and pole are dovetailed into each other and fastened by a movable bolt. The handle is fastened to both ends of the body, leaving the pole free to move on removal of bolt. Half-way along the body an iron bar is fastened through the body, and goes through the pole. At the top of the iron are several holes by means of which the angle between body and pole can be regulated. The share is 6½ inches broad and spear-shaped, being fastened to end of the body. The total cost of construction, including labour and material, is between Rs. 5 and Rs. 6, depending on price of wood.

Hardened steel shares were imported from England before the war at R. 1 each. These increased the life of the plough considerably.

Ridging. For ridging up land a piece of wood as shown in diagram is inserted in front of the iron bar. The cost of ridging with the plough is very considerably cheaper than the same work done by hand with the "kodar." With a couple of ploughings, land will generally be in sufficiently good tilth for ridging up. This is essential for the proper growth of Egyptian cotton; also useful, among other crops, for potatoes. This plough has an advantage over an English plough in that the cultivator takes to it naturally. He has no difficulty in holding it, as he has with some of the two-handled iron ploughs.

II. The "Gassibiah" or Scraper for levelling land.

This implement is specially important on irrigated land. On an irrigation canal, in particular, it is essential that the fields should be quite level, otherwise it is impossible to give a uniform watering to any crop. Watering unlevel ground is not only a very common source of much waste of water but is also injurious to the crops and is apt to favour the accumulation of "kalar" or alkali at one end of the field. It is not an uncommon sight to see crops in Sind being watered 10 to 12 inches deep at one end of a field and dry at the other.

On the other hand, dividing up the land according to its natural level into small irregular patches is exceedingly wasteful both of land and water.

If, however, the land were divided into rectangular plots and properly levelled to begin with, the result would be much more satisfactory.

It is good practice to level new ground into rectangular 1-acre plots and to make bunds with the scraper all round and one bund across the

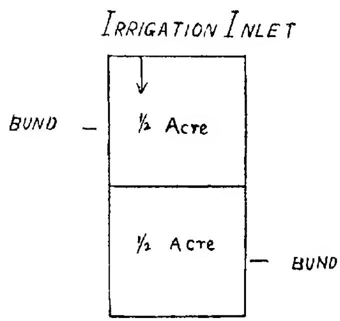


PLATE I.

PLOUGH.

PLATE II.

SCRAPER FILLING.

PLATE III.

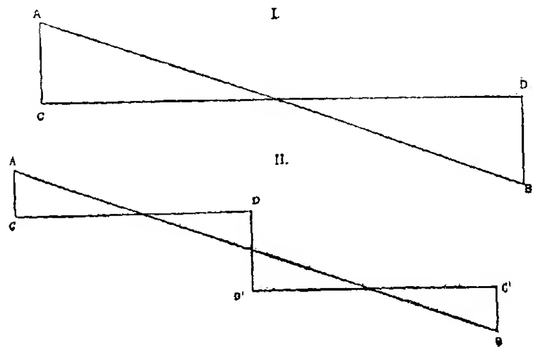
SCRAPER RETURNING EMPTY.

middle. These bunds are permanent and so save the expense of renewing for every crop, and are much less likely to break with the consequent wastage of water.

On non-irrigated land also there are many places where levelling can be done to prevent erosion where the rainfall is great and also to fill bad hollows.

At Pusa it took 5 scrapers, and 2 ploughs working in front of them, 45 days to level 17 acres of very uneven rice land, *i.e.*, 5 scrapers and 2 ploughs did one acre in between 2-3 days. (*See* Frontispiece.)

In irrigated land levelling is a most expensive operation, and unnecessary levelling means much extra expense. More money can be wasted in levelling than in any other agricultural operation. It is not advisable to have adjacent land at very different levels as damage may be done by infiltration. In a plot however that does not vary more than a foot, it is advisable to put up a central bund and level each part separately, *e.g.* :



If A-B represents level of original plot levelled to C-D and in II levelled to C-D and C′-D′ then in levelling I there is double the quantity of earth moved double the distance compared to II, *i.e.*, four times the cost.

In Sind it was found that letting water into a 50×150 yards plot at one end tended to accumulate alkali at the far end; so all the plots were divided by a central bund, the top portions being watered by a special "add" (water channel) and so fresh water was put on directly to each 75×50 yards portion, net $\frac{3}{4}$ of an acre.

Construction. The scraper is a box-shaped arrangement, the sides being 2 feet long and 9 inches high, and these are continued into handles 3 feet long, the ends being 2 feet from the ground. At this point they are 1 foot 8 inches apart and at the gathering edge $2\frac{1}{4}$ feet. The bottom is convex and is formed of strips of wood nailed to the sides and protected with sheet iron strips. The gathering edge is of iron 4 inches wide. The illustrations (Plates II and III) clearly show its construction and working. When filled with earth, it is simply tipped over and the soil may either be spread out gradually or put in one place to make a bund. A rope is fixed across the handle which rests on the draft chain when returning empty. The scraper can also be used for grading roads or making embankments. The price is Rs. 7.

III. The "Norag" or Threshing Machine.

This implement (Plate IV) is a valuable one where power threshing machines are not used. Though primarily intended for wheat, it will thoroughly thresh gram, *mutter* (*P. arvense*), rice, *jowar* (*Sorghum vulgare*) and *bajri* (*Pennisetum typhoideum*). It leaves the straw cut up in suitable condition for feeding. The country system of threshing by tying a number of cattle together and making them walk round in a circle is a slow and most primitive method.

This machine, called in Egypt the "Norag," consists of 3 axles, on each of which are fixed six to seven iron discs. The axles revolve in iron bearings, and the whole rests in an angle iron frame. The machine is pulled by one pair of bullocks and will thresh as much as five to six pairs of bullocks would tread out.

The discs are kept sharp by the occasional use of the file. Beyond this the machine needs no attention, as the whole thing is strong and practically indestructible.

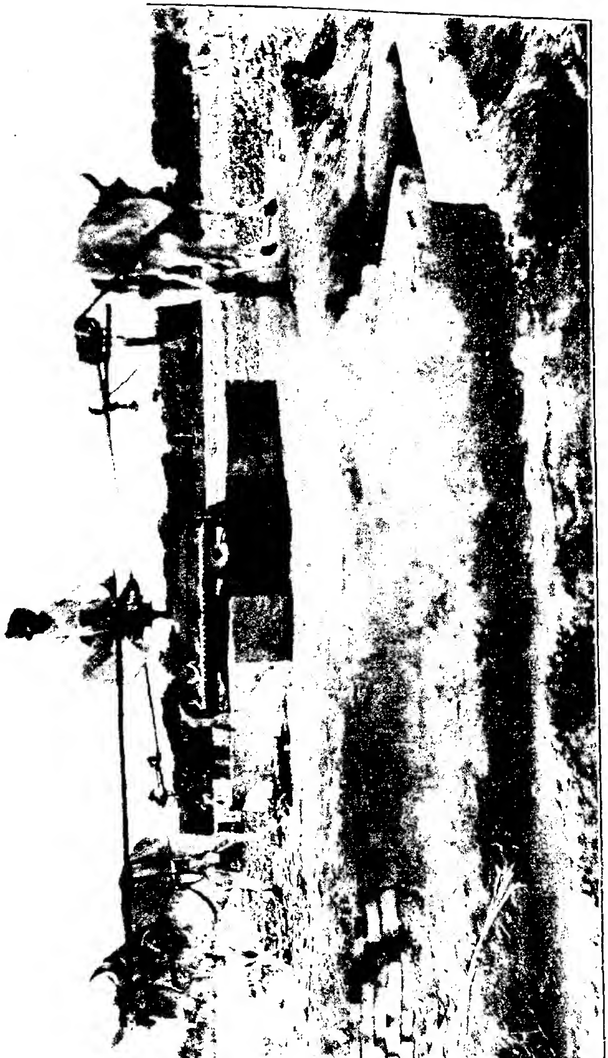
The iron discs are $1\frac{1}{2}$ feet in diameter, and the price of the machine is about Rs. 40.

In working, the grain is put in a heap on the threshing floor and a thin layer spread out round the circumference of the heap. The Norag is driven round this and the straw kept carefully turned. Fresh material is gradually taken from the heap, which gradually diminishes in size, till the whole is threshed. The circle also gets less and less in diameter till the lot is finished.

PLATE IV.

THE "NORAG" OR THRESHING MACHINE.

PLATE V.



ARCHIMEDIAN SCREW WATER-LIFT.

PLATE VI.

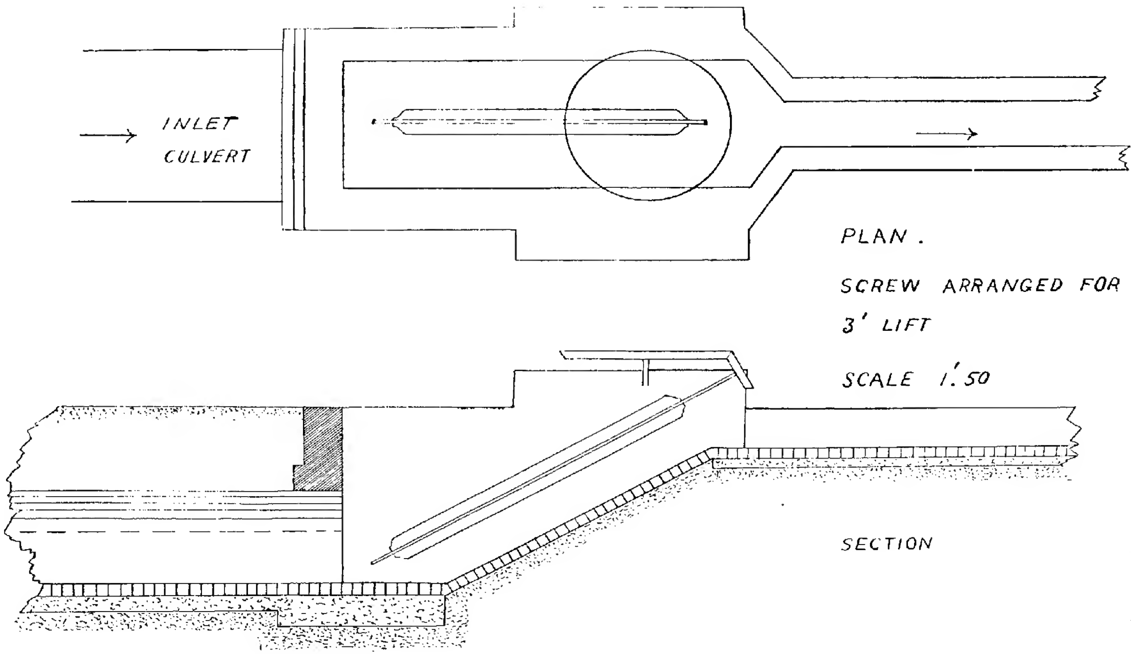
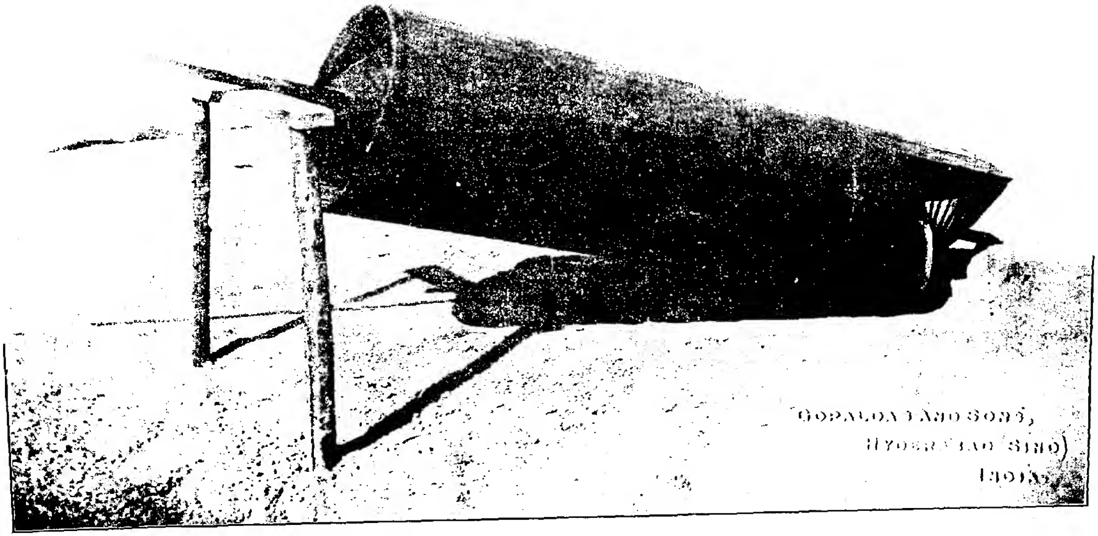

INLET
CULVERT
PLAN.
SCREW ARRANGED FOR
3' LIFT
SCALE 1/50
SECTION

PLATE VII.



WOOD ARCHIMEDIAN SCREW

It is necessary to keep the layer of grain which is being threshed thick enough to prevent injury by bruising between ground and the iron discs. Complaints of cutting of grain have been traced to neglect of this precaution.

IV. Archimedian Screw Water-Lift.

On irrigated land there are generally areas which are just above flow water level and a great desideratum is an efficient water-lift driven by animal power to raise water generally not more than 3 feet.

A Persian wheel is often used in India on a 3 feet lift, this is not efficient. A one-bullock Persian wheel on a small lift will discharge from 0·10 to 0·12 cubic foot per second. The photo (Plate V) illustrates a machine, which gives an estimated discharge of nearly 1 cubic foot per second on a 2 feet lift, *i.e.*, will water an acre 1 inch deep in an hour. It consists of a double spiral working in a tight masonry cylinder. The cost is Rs. 600 (pre-war) and unlike the Persian wheel or "Hurla" does not need to be re-made or re-fitted each season. At Mirpur Khas (Sind) the masonry cost Rs. 200; diagrams in Plate VI show how this is constructed.

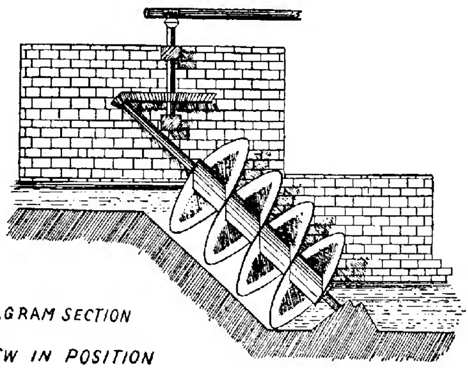


DIAGRAM SECTION OF SCREW IN POSITION

V. Wood Archimedian Screw.

This is a very common implement in Egypt and when water is scarce or at a low level the "Fellaheen" can be seen working it day and night. (Plate VII.)

The centre is composed of a square iron shaft and round this thin pieces of wood are strung. Each piece of wood has a square hole in

the middle, the holes are made at a greater and greater angle, so the slips of wood form a double spiral. The edges of each piece of wood are bevelled to give a smooth passage for the water. Finally the implement is encased in a wood cylinder and a handle put at the end of the shaft. The bottom end is inserted into the water to be lifted. The construction is simple, the length being varied according to need and diameter 14-16 inches.

The out-turn of water is very good, and the implement can be made by any village "mistri."

VI. Dutch Water Wheel.

This is a new patent water-lift (Plate VIII) which is now being used in Egypt. It is also for short lifts.

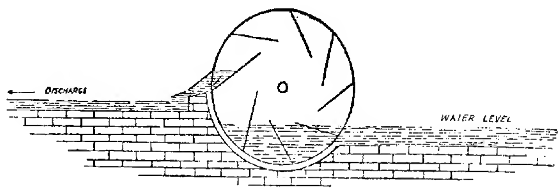


DIAGRAM DUTCH WHEEL

It consists of 2 large iron discs on an axis. Between the discs are vanes set at such an angle (about 40° with the horizon) that water can be lifted between the vanes and the masonry case, till the water is higher than a small wall. When the wheel revolves the water flows over the wall into the irrigation channel.

The wheel is simple and easy to run. Dr. Parr of the United Provinces gave this machine a trial and has favourably reported on it.

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PLATE VIII.